



Interagency Monitoring of Protected Visual Environments

Background

Regional haze is visibility impairment caused by the cumulative emission of air pollutants from numerous sources over a wide geographic area. The primary cause of regional haze is the scattering and absorption of light by fine particles. The fine particles that commonly cause hazy conditions in the eastern U.S. are composed primarily of sulfate, nitrate, and crustal material (e.g., soil dust, sea salt).

Interagency Monitoring of Protected Visual Environments (IMPROVE) was initiated in 1985 to aid the 1977 Clean Air Act to prevent future, and remedy existing, visibility impairment in Class I areas (i.e. Regional Haze Rule). The Regional Haze Rule issued by the EPA in April 1999 allows federal land managers to directly influence future visibility and other air quality related values at national parks. The Rule sets a 60 year timeline for states to improve visibility within mandatory federal Class I areas from Baseline (2000-2004) levels to Natural Conditions by 2064. Although, CACO is a Class II area, it maintains in collaboration with the EPA and UC Davis, an IMPROVE monitoring site.

Monitoring

Particulate matter are tiny airborne particles or aerosols, which include dust, dirt, soot, smoke, and liquid droplets. They emanate from outdoor sources such as car exhausts and forest fires and indoor sources such as fireplaces and candles. Fine particulate matter (mostly below 2.5 microns in size) are not only the result of direct emissions, but can be formed in the atmosphere by chemical reactions involving gaseous pollutants. The standard IMPROVE sampler consists of four independent sample modules which includes filters for PM_{2.5} and PM₁₀ with 24 hour continuous cycle samples collected every third day.

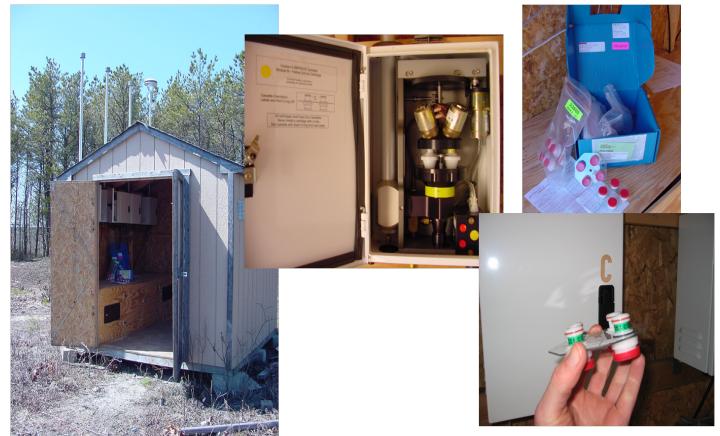


Figure 1. IMPROVE sampler with four sample modules and filters.

Particulate matter can have both negative health and environmental effects. Long-term exposure can cause particles to accumulate in the lungs affecting breathing, and degrading lung tissue. Environmentally, the pollutants that contribute to haze also help form ground-level ozone which can cause significant damage to forests and ecosystems.

Sulfates and nitrates contribute to the formation of acid rain, which damages forests, erodes building materials, and causes lakes and streams to become acidic, making them unsuitable for many fish and other organisms.

Management Applications

IMPROVE helps to document long-term trends for assessing progress towards national visibility goals. Monitoring of air quality issues within the National Park Service system is especially imperative because even at relatively low levels, air pollution affects ecological health, scenic views, human health, and visitor enjoyment.

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